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(54) **AUTOTHERMAL HYDROGEN STORAGE AND DELIVERY SYSTEMS**

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See application file for complete search history.

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(57) **ABSTRACT**

Processes are provided for the storage and release of hydrogen by means of dehydrogenation of hydrogen carrier compositions where at least part of the heat of dehydrogenation is provided by a hydrogen-reversible selective oxidation of the carrier. Autothermal generation of hydrogen is achieved wherein sufficient heat is provided to sustain the at least partial endothermic dehydrogenation of the carrier at reaction temperature. The at least partially dehydrogenated and at least partially selectively oxidized liquid carrier is regenerated in a catalytic hydrogenation process where apart from an incidental employment of process heat, gaseous hydrogen is the primary source of reversibly contained hydrogen and the necessary reaction energy.

24 Claims, 9 Drawing Sheets